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Title: Lessons Learned Nuclear Material Container Safety

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# Lessons Learned
# Nuclear Material Container Safety

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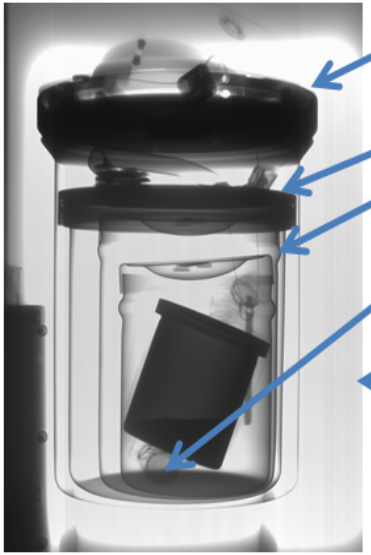
# Event Description

- On November 20, 2019 a process deviation was initiated by NPI-7 for packages located in the packing room that had additional non-metal shielding described in TA55-DOP-091 “TA55 Nuclear Material Packaging” that did not receive a specific criticality safety evaluation.
- Violation of ¾ inch rule - A criticality safety rule defined in PA-RD-01009 and implemented in TA55-DOP-091.

**Example of an approved nested container**



- Outermost container is a SAVY
- Second container is Hagan
- Package includes approved inner container (SS slip lid)
- Package includes a bagout bag (not required)
- Radiograph was used to verify that the sum of all metal wall thicknesses is less than 0.75 inches thick

# Description of ¾ inch rule

- This rule is commonly known as the ¾ inch rule where the total side wall thickness for all metal layers including shielding and/or fixtures (measured from the middle outward) must be less ¾ inch, unless:
  - otherwise specified by the criticality safety requirements for the FMOs where the SNM will be staged.
  - containers having a total side wall greater than 0.75 inches may only be packaged if permitted by a specific criticality safety evaluation.
- The achievement of nuclear criticality safety depends on controlling either the mass of the fissile material or neutron behavior.
- To limit neutron reflection, control may be exercised administratively through procedures (e.g., in this case by requiring that a thickness not exceed an established limit).
- The rule allows NCS to consider it as a limiting condition when doing evaluations. Because ¾ inch is thick enough to accommodate most packaging schemes and not so thick as to cause problematic neutron reflection.

# Analysis

- Staff were unclear that the use of new shielding or changes to existing temporary or permanent shielding must have concurrence from the Nuclear Criticality Safety Division (NCSD) prior to implementation.
- Shielding of any type (BISCO, temporary PMMA, etc.), unless already allowed by the criticality safety evaluation, shall not be added or altered without first having a criticality safety review performed.
- TA-55 staff evaluated packages located in the packing room that had additional non-metal shielding described in TA55-DOP-091 “TA55 Nuclear Material Packaging” that did not receive a specific criticality safety evaluation.
- Determined that metal or graphite fixtures (e.g. for criticality spacing, heat dissipation, component protection, etc.) were included in the Pre-Packaging Container Content Checks, TA55-DOP-091 attachment A and that the total side wall thickness for all metal layers was ≤ 0.75 inches .

# Takeaways

- Bringing in a new or modified container requires approval prior to use in TA-55 (PA-AP-01207).
- The ¾ inch rules applies to total container wall thickness and is a criticality safety requirement.
- The ¾ inch rule limits neutron reflection in packaging configurations.
- Containers having a total sidewall greater than ¾ inches may only be packaged with a specific criticality safety evaluation.
- Included information and training on the ¾ inch rule in quarterly FMH briefings to encourage understanding and discussion.